REMARKS

Review and reconsideration on the merits are respectfully requested.

In paragraph 1 at page 2 of the Office Action, the Examiner objects to the Abstract of the Disclosure, for the reasons given. Applicants respectfully submit that the amended Abstract shown herein resolves any stated grounds of objection. Also, the revised Abstract is attached hereto on a clean sheet, for ease of insertion into the file.

In paragraph 2 at page 2 of the Office Action and in paragraph 3 at the top of page 3, the Examiner requires correction of certain minor grammatical points in the specification. The Examiner is kindly requested to note the changes set forth on pages 3-9 of the specification. Again, it is believed that any perceived grounds of objection are resolved by these amendments.

In view of the foregoing, reconsideration and withdrawal of the objections to the specification are respectfully requested.

At page 3, in paragraphs 4 and 5, the Examiner notes certain informalities in claims 9-19 and 20, respectively. Applicants respectfully submit that the amendments to the claims as shown herein resolve the perceived informalities. Of course, none of these amendments narrows the scope of any of these claims in any manner. In view of the foregoing, withdrawal of the claim objections is respectfully requested.

Claims 2, 3, 7, 11, 17 and 20 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Several grounds in support of the rejection are set forth, each of which is addressed separately below.

(1) First, at the top of page 4 the Examiner objects to the phrase "heat-resistant polymer" in claim 2. The Examiner argues that the term "heat-resistant" is indefinite and not defined by the claim, and that the specification does not provide a standard for ascertaining the requisite degree, so that one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

In response, the Examiner is kindly requested to note the amended language of claim 2, wherein the heat-resistant polymer has been defined with more particularity, in accordance with a preferred embodiment based on the disclosure at page 8, lines 21-25. It is respectfully submitted that this ground of rejection has been overcome.

(2) The second and third paragraphs on page 4 of the Office Action are related. The Examiner correctly notes that there is no antecedent basis for the phrase "the flattening layer" in line 2 of claim 3, because claim 1 does not refer to a flattening layer. However, claim 2 introduces the presence of a flattening layer; but the Examiner notes that claim 4 already defines the thickness of the flattening layer.

In response, Applicants have cancelled dependent claims 3, 7, 11 and 17 without prejudice or disclaimer, since they appear to be unnecessary.

(3) Lastly, the Examiner objects to the term "metal seed layer" in lines 10 and 13 of claim 20. Applicants have followed the Examiner's suggestion to delete the term "metal" before "seed layer" in the 10^{th} and 13^{th} lines of claim 20, since the initial use of the phrase in the claim is merely "a seed layer". As is apparent, these amendments to claim 20 do not reduce its scope in any fashion.

In view of the foregoing, reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, second paragraph, is respectfully requested.

In paragraph 9 at pages 4-5, claims 1, 9 and 15 stand rejected under 35 U.S.C. 102(e) as allegedly being anticipated by Okuyama et al, U.S. Patent 6,071,607. With respect to independent claim 1, the Examiner argues that Okuyama discloses a floppy disk, comprising a primer layer, a magnetic layer, a protective layer, and a lubricating layer coated on at least one of the surfaces of a nonmagnetic support member. The Examiner argues that a seed layer is provided between the support member and the primer layer. With respect to the claim terms "floppy disk" and "flexible" support member, the Examiner interpreted these to mean any non-glass, ceramic, silicon or carbon substrate.

This rejection is respectfully traversed. The floppy disk of Applicants' independent claim 1 is clearly patentable over Okuyama for at least the following reasons.

Okuyama et al. (U.S. Patent 6,071,607) relates to a magnetic recording medium comprising a rigid base material.

For instance, the use of NiP/A1 disk substrate is described in Examples 1-6. In Example 7, description is given on a magnetic disk device using a magnetic recording medium. Fig. 34 shows an example, which is mounted on a device comprising 3 magnetic disks. When a plurality of magnetic disks are coaxially fixed and used in this manner, stable operation cannot be assured if the magnetic recording medium is a flexible disk; therefore, a rigid disk must be used.

Also, each of the materials described in Okuyama et al. (column 10, lines 35-40) is a base material for rigid disk, and "plastic disks" also mean the material for rigid disks. This aspect of Okuyama et al is different from the flexible disk of the invention of the present application, and this reference does not disclose the flexible type magnetic recording medium as described in the present application. Thus, Okuyama et al fail to anticipate any of the present claims.

Moreover, "an additional primer layer" described in Okuyama et al is formed on a rigid support member, and it is provided for the purpose of reducing the variations in particle size of crystal in the primer layer.

In contrast, as described in the specification, page 6, the last line - page 7, line 6, the "seed layer" formed on the floppy disk of the present invention serves as a layer to prevent cracks, which may occur due to the difference in thermal and mechanical characteristics such as thermal shrinkage ratio between the non-rigid support member and the metal layer. While this layer is formed at the same position as "an additional primer layer" as described in Okuyama et al, the present invention is different from Okuyama et al in the purpose for providing the layer, its operation, and its effect. Thus, Okuyama et al fail to disclose or suggest the "seed layer", as defined in the present application, much less recognize the problems it solves and/or advantage obtained.

Accordingly, for the foregoing reasons, Applicants respectfully request that the rejection set forth in paragraph 9 be withdrawn, since Okuyama et al fail to defeat the patentability of the instant claims.

In paragraph 11, claims 2, 4-6, 8, 10, 12-16, 18 and 19 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Okuyama as applied to claims 1, 9 and 15 above, and further in view of Hosoi et al, U.S. Patent 5,702,794.

Each of the claims rejected in paragraph 11 is a dependent claim. If independent claim 1 is allowed, each of these rejected dependent claims will be allowable as well.

Accordingly, at this time Applicants incorporate by reference the above comments distinguishing claim 1 from Okuyama et al, since if claim 1 is found allowable, each of the dependent claims rejected in paragraph 11 must be allowed as well.

In paragraph 12 at pages 6-8 of the Office Action, claim 20 stands rejected under 35 U.S.C. § 103(a) as patentable over Okuyama in view of Hosoi, and further in view of Okudaira et al (U.S. Patent 4,735,853) and Maro et al (U.S. Patent 6,027,801). The Examiner's position is set forth in a fair amount of detail, and will not be repeated verbatim herein. However, the Examiner argues that Okuyama in view Hosoi disclose the basic layer structure of the floppy disk, and that Okuyama further discloses seed layers meeting Applicants' claimed thickness limitation in claim 20, referring to Figure 25 of Okuyama.

The Examiner admits that neither Okuyama nor Hosoi disclose the linear expansion coefficient of the seed layer and the linear expansion coefficient of the primer layer as satisfying the claimed relationship set forth in claim 20.

This rejection is respectfully traversed.

Applicants respectfully submit that independent claim 20, directed to a floppy disk, is patentable over the primary reference, Okuyama et al, for at least the same reasons that claim 1 is patentable over Okuyama et al. Moreover, Applicants respectfully submit that Okuyama et al fail to disclose or suggest a seed layer as recited in Applicant's claim 20 (and claim 1, as discussed above), much less the more particular characteristics of the seed layer as recited in claim 20.

Accordingly, claim 20 is distinguishable over the primary reference, to Okuyama et al, for at least the same reasons set forth above with respect to claim 1.

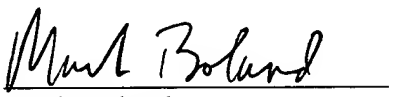
Applicants respectfully submit that none of the secondary references teach or suggested the claimed features or are combinable with Okuyama in a manner which allegedly suggests the present invention of claim 20.

For the foregoing reasons, reconsideration and withdrawal of the rejection set forth in paragraph 12 is respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,



Mark Boland
Registration No. 32,197

SUGHRUE MION, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: April 10, 2002

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Please amend page 3, line 16 to page 4, line 13, as follows:

Further, the present invention provides a floppy disk as described above, wherein the thickness of the flexible support member is within the range of 30 - 100 μm.

Also, the present invention provides a floppy disk as described above, wherein a Co-Cr alloy with a Cr concentration within the range of 10 - 30 atom % is used for the magnetic layer.

Further, the present invention provides a floppy disk as described above, wherein a Cr alloy with a Cr concentration within the range of 77 - 100 atom % is used as the primer layer.

Also, the present invention provides a floppy disk, which comprises a flattening layer with a thickness of 0.1 - 5 μm, a seed layer, a nonmagnetic primer layer containing a Cr alloy with a Cr concentration of 77 - 100 atom %, a magnetic layer containing a Co-Cr alloy with a Cr concentration of 10 - 30 atom %, a protective layer, and a lubricating layer, all of said layers being coated on at least one of the surfaces of a flexible support member with a thickness of 30 - 100 μm, whereby the thickness of the seed layer is 5 - 100 nm, and the linear expansion coefficient (E_{SE}) of the [metal] seed layer and the linear expansion coefficient (E_{UL}) of the nonmagnetic primer layer satisfy the relation: $|E_{SE} - E_{UL}|/-E_{UL} < 0.3$, and the tensile strength (S_{SE}) of the [metal] seed layer and the tensile strength (S_{UL}) of the nonmagnetic primer layer satisfy the relation: $S_{SE}/S_{UL} > 1$.

Please amend the paragraph at page 5, line 16 to page 6, line 3, as follows:

When a hard disk made of aluminum, glass, etc. is used as a support member, it is possible to attain flatness closer to mirror surface by polishing. In case of a floppy disk, however, a flexible support member is used as the support member, and it is very difficult to improve the flatness by polishing. In this respect, by providing a polymeric flattening layer [made of polymer] on the flexible support member, [the] surface properties similar to a hard disk support member can be attained. On the flattening layer, a nonmagnetic primer layer and a magnetic layer are formed by sputtering. In order to increase the magnetostatic property and electromagnetic transfer characteristics of the magnetic layer, it is necessary to heat the support member at a high temperature of 100°C - 300°C. [Or] Alternatively, the temperature of the support member is effectively increased when bias voltage application, RF sputtering method, etc. are used.

Please amend the paragraph at page 6, lines 11-27, as follows:

In a hard disk, the support member is made of a hard material, and metal, ceramics, glass, etc. are typically used as the material. In this respect, the difference of expansion coefficient is small between the primer layer and the support member, and there is less possibility that cracking occurs during heating and cooling processes due to the difference in thermal expansion. In a magnetic recording medium using a flexible support member as the substrate, the flexible support member and the flattening layer are made of macromolecular compositions, and the nonmagnetic primer layer and the magnetic layer are made of a metal material. For this reason, thermal expansion or shrinking differs between these two layers by about one digit. The material

of the nonmagnetic primer layer cannot endure the deformation of the support member when cooled down, and this may result in cracking on the magnetic recording medium.

Please amend the paragraph at page 7, lines 7-18, as follows:

It is proposed to use the following material as the material of the seed layer and the primer layer, i.e. a material, in which the linear expansion coefficient (E_{SE}) of the metal seed layer and the linear expansion coefficient (E_{UL}) of the nonmagnetic primer layer satisfy the relation: $|E_{SE} - E_{UL}|/E_{UL} < 0.3$, and the tensile strength (S_{SE}) of the metal seed layer and the tensile strength (S_{UL}) of the nonmagnetic primer layer satisfy the relation: $S_{SE}/S_{UL} > 1$. [Then,] In this manner, it is possible to cope with the force, which is generated due to the difference of the linear expansion coefficients between the primer layer and the magnetic layer in the cooling process, and cracking can be prevented on a higher level.

Please amend page 7, line 25 to page 9, line 1, as follows:

For the purpose of preventing cracking during the above process, such materials are used that the linear expansion coefficient (E_{SE}) of the metal seed layer and the linear expansion coefficient (E_{UL}) of the nonmagnetic primer layer satisfy the relation: $|E_{SE} - E_{UL}|/E_{UL} < 0.3$, and the tensile strength (S_{SE}) of the metal seed layer and the tensile strength (S_{UL}) of the nonmagnetic primer layer satisfy the relation: $S_{SE}/S_{UL} > 1$. As a result, it is possible to prevent cracking during the preparation of the medium and to provide a floppy disk with high recording density.

[Next,] The following description [will be given on] relates to the materials which are preferably used in the present invention.

As the support member of the magnetic recording medium of the present invention, polyethylene terephthalate, polyethylene naphthalate, polymide, polyamide, polyamideimide, polybenzoxazole, etc. may be used. The Young's modulus of the support member of the magnetic recording medium of the present invention is preferably 200 - 1600 kg/mm^2, or more preferably 300 - 800 kg/mm^2. The thickness of the support member is preferably 20 - 150 μm, or more preferably 30 - 80 μm.

To improve the flatness of the surface of the support member, a flattening layer is provided on the support member. For the flattening layer, a heat-resistant polymer may be extensively used. More preferably, [the] a material such as a silicone resin, a polyamide resin, a polyamideimide resin, a polyimide resin, etc. may be used. These materials have high heat-resistant properties and exhibit excellent performance in surface [property] properties magnetostatic [property] properties. Coating thickness of the flattening layer is preferably 0.1 - 5.0 μm, or more preferably 0.5 - 3.0 μm, or most preferably 0.8 - 2.0 μm.

IN THE CLAIMS:

Please cancel claims 3, 7, 11 and 17 without prejudice or disclaimer.

Claims 2, 4-6, 8-10 12-16 and 18-20 are amended as follows:

2. (Amended) A floppy disk according to claim 1, wherein there is provided a flattening layer, comprising a heat-resistant polymer selected from the group consisting of a silicone resin, a polyamide resin, a polyamideimide resin, and a polyimide resin, on the flexible nonmagnetic support member.

4. (Amended) A floppy disk according to claim 2, wherein the thickness of the flattening layer is within the range of 0.1 - 5 μm.

5. (Amended) A floppy disk according to claim 1, wherein the thickness of the flexible support member is within the range of 30 - 100 μm.

6. (Amended) A floppy disk according to claim 2, wherein the thickness of the flexible support member is within the range of 30 - 100 μm.

8. (Amended) A floppy disk according to claim 4, wherein the thickness of the flexible support member is within the range of 30 - 100 μm.

9. (Amended) A floppy disk according to claim 1, wherein a Co-Cr alloy with a Cr concentration within the range of 10 - 30 atom % is used for the magnetic layer.

10. (Amended) A floppy disk according to claim 2, wherein a Co-Cr alloy with a Cr concentration within the range of 10 - 30 atom % is used for the magnetic layer.

12. (Amended) A floppy disk according to claim 4, wherein a Co-Cr alloy with a Cr concentration within the range of 10 - 30 atom % is used for the magnetic layer.

13. (Amended) A floppy disk according to claim 5, wherein a Co-Cr alloy with a Cr concentration within the range of 10 - 30 atom % is used for the magnetic layer.

14. (Amended) A floppy disk according to claim 6, wherein a Co-Cr alloy with a Cr concentration within the range of 10 - 30 atom % is used for the magnetic layer.

15. (Amended) A floppy disk according to claim 1, wherein a Cr alloy with a Cr concentration within the range of 77 - 100 atom % is used as the primer layer.

16. (Amended) A floppy disk according to claim 2, wherein a Cr alloy with a Cr concentration within the range of 77 - 100 atom % is used as the primer layer.

18. (Amended) A floppy disk according to claim 4, wherein a Cr alloy with a Cr concentration within the range of 77 - 100 atom % is used as the primer layer.

19. (Amended) A floppy disk according to claim 5, wherein a Cr alloy with a Cr concentration within the range of 77 - 100 atom % is used as the primer layer.

20. (Amended) A floppy disk, comprising a flattening layer with a thickness of 0.1 - 5 μm, a seed layer, a nonmagnetic primer layer containing a Cr alloy with a Cr concentration of 77 - 100 atom %, a magnetic layer containing a Co-Cr alloy with a Cr concentration of 10 - 30 atom %, a protective layer, and a lubricating layer, all of said layers being coated on at least one of the surfaces of a flexible support member with a thickness of 30 - 100 μm, whereby the thickness of the seed layer is 5 - 100 nm, and the linear expansion coefficient (E_{SE}) of the [metal] seed layer and the linear expansion coefficient (E_{UL}) of the nonmagnetic primer layer satisfy the relation: $|E_{SE} - E_{UL}|/E_{UL} < 0.3$, and the tensile strength (S_{SE}) of the [metal] seed layer and the tensile strength (S_{UL}) of the nonmagnetic primer layer satisfy the relation: $S_{SE}/S_{UL} > 1$.

IN THE ABSTRACT OF DISCLOSURE:

The Abstract on page 23 is changed as follows:

[The present invention provides a] A magnetic recording medium, which comprises a flattening layer with a thickness of 0.1 - 5.0 μm, a seed layer, a nonmagnetic primer layer containing chromium with a chromium concentration of 77 - 100 atom %, a Co-Cr type alloy magnetic layer, a protective layer, and a lubricating layer coated sequentially on at least one of

the surfaces of a flexible nonmagnetic support member, whereby the [metal] seed layer is designed in such a manner that the linear expansion coefficient (E_{SE}) of the [metal] seed layer and the linear expansion coefficient (E_{UL}) of the nonmagnetic primer layer satisfy the relation: $|E_{SE} - E_{UL}|/E_{UL} < 0.3$, and the tensile strength (S_{SE}) of the [metal] seed layer and the tensile strength (S_{UL}) of the nonmagnetic primer layer satisfy the relation: $S_{SE}/S_{UL} > 1$[, and a floppy disk is produced by preventing cracking during the manufacture of the floppy disk].